

More Python: numpy & argparse

essential modules to master

numpy

- numpy (typically imported as "import numpy as np") is a lot like MATLAB. It has many sub-modules and methods for very fast matrix manipulation. You should always use these methods when you can, instead of using explicit loops in your code, because they are MUCH faster.
- For example, to multiply two large arrays by hand requires a double-nested for-loop. But if they are numpy arrays and you just type `array_1*array_2` it will use optimized, compiled C-code to do the job. This is the same approach MATLAB takes.

argparse

- argparse is a handy module that allows you to pass information to a python program from the command line (in linux or in ipython).
- It uses a format that is very similar to that for linux commands
- e.g. in ipython:
- `run my_program -a 7.7 -b 2020.04.28 -f True`
- Here I have passed three pieces of information to the program, as flag-value pairs, so for example the number 7.7 is associated with the variable "a" (or a longer, more informative name) inside the program.
- The advantage of using argparse is that then you often do not have to edit your code to get it to do a different version of its job. This allows you to write code that can work both on your laptop and on a remote machine, potentially working on a much larger pile of data in the remote case.
- Even if you are just working on one machine argparse can make one piece of code much more versatile, without editing.

Examples

- Please see the code examples in my class code folder "pmec". I have put this in GitHub so you can clone it to your machine using either:
- `git clone [URL]`
- or File -> Clone Repository -> URL Tab in GitHub Desktop
- then use `git pull` to update anytime, or (I think) the Fetch origin button in GitHub Desktop.
- the URL is:
- <https://github.com/parkermac/pmec.git>
- The code for this week is in the folder `pmec/ex_numpy`.

Resources

- The pages here are a nice tutorial for basic numpy operations
- <https://numpy.org/doc/stable/user/index.html>